

M E R T T

Patient Handling



INTRODUCTION

This module provides information on how to assess the risk of your response efforts, remembering that the care of the patient takes priority over radiological concerns.

The three general classes of patients (exposed to radiation, externally contaminated, internally contaminated) encountered at a radioactive material transportation incident will be discussed as well as proper procedures for safely rescuing and handling patients at the scene.

PURPOSE

The purpose of this module is to help you assess the potential risks in handling contaminated patients at a radioactive material transportation incident. This module will aid you in preparing patients for transport from the incident scene to the hospital.

MODULE OBJECTIVES

Upon completion of this module, you will be able to:

1. Identify the risks to response personnel when rescuing injured persons at a radioactive material transportation incident.
2. Identify the importance of gross decontamination for radiologically contaminated patients.
3. Identify methods for preparing radiologically contaminated patients for transport to the hospital.

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ASSESSING THE RISK

At the site of a radiological transportation incident, it is as important to ensure your own safety as it is to ensure the safety of all patients at the scene. Always approach an incident site with caution and look for all hazards. Isolate the area and keep non-essential people away from the scene and outside the safety perimeter. **When handling patients, use Universal Precautions as an approach to infection control** (per 29 CFR 1910.1030).

Questions to consider before entering the incident scene include:

- How much and what type of protection does your personal protective equipment (PPE) provide?
- How much time will it take and what is the best route to rescue patient(s) and avoid radiation or contamination areas? (Planning a strategy before entering the scene may help reduce the time spent near radiation sources).
- What other hazards are present (fire, spilled diesel, downed power lines, etc.)?

Remember that care for the patient takes priority over radiological hazard assessment. Look for the following when entering the area to perform rescue operations:

- How many (if any) patients?
- What types of injuries?
- Are there any packages with visible labels?
- Do any packages look as though they are leaking, or breached?

Remember that dose rates from undamaged packages are considered to have acceptable radiation/contamination levels on the surface of the package.

- What types of packages are present?

Remember that Excepted, Industrial, and Type A Packages contain non-life-endangering amounts of radioactive material.

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EMERGENCY MEDICAL PROCEDURES

Medical problems take priority over radiological concerns. Use of Universal Precautions will help reduce the spread of radiological contamination. Radiation exposure or contamination resulting from a radioactive material shipment will not cause unconsciousness or immediate visible signs of injury.

Some radioactive materials are corrosive (e.g., uranium hexafluoride - UF_6), and contact with corrosives may result in chemical burns or respiratory injury. Chemical burns from corrosive radioactive material are managed like any other corrosive injury. Treat patients according to the nature of their injuries. The presence of radiation will not interfere with any rescue or extrication equipment used, nor will it influence the extinguishing properties of fire fighting agents.

Unless your standard operating procedures dictate otherwise, do not delay treatment due to the lack of survey meters or protective clothing. According to the ERG, emergency life-saving assistance is always of higher priority than the priority for measuring radiation levels. Take precautions against the spread of contamination. When handling a potentially contaminated patient, a calm attitude may be the most important form of treatment you can provide.

Remember that radiation exposure is different from contamination. Contamination is a material—something that you can get on you or in you. Radiation (exposure), however, is energy—something that can pass right through you—and exposure to radiation alone will not contaminate you.

DOE offers a Transportation Emergency Preparedness Program (TEPP) model procedure for packaging and transporting contaminated patients.¹

¹ Information can be obtained at the Department of Energy's web site:
<http://www.em.doe.gov/otem/program.html>.

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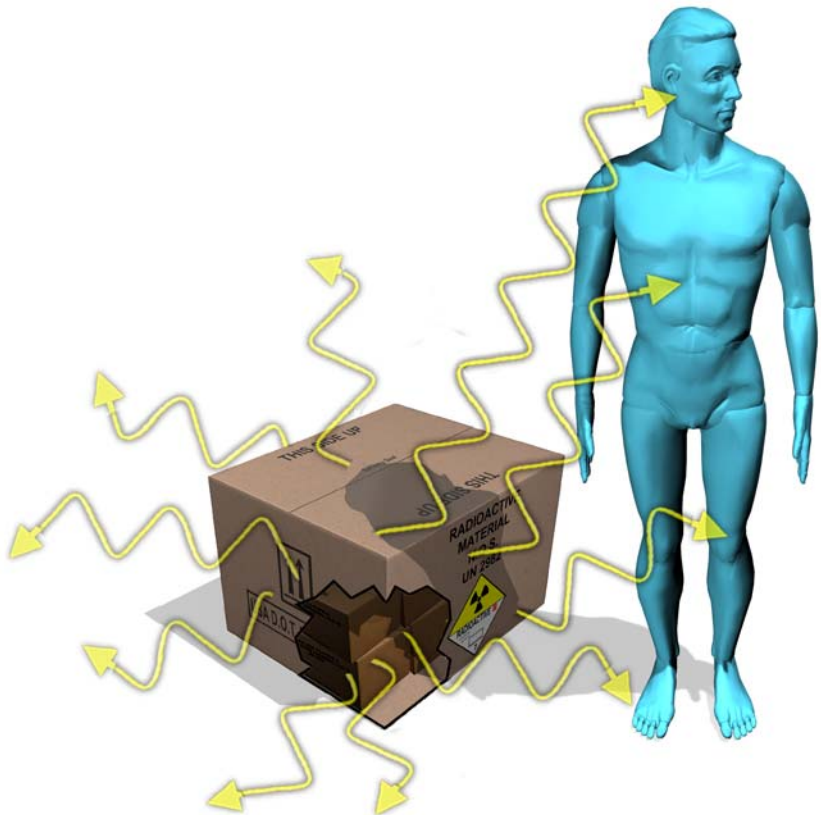
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TYPES OF EXPOSURE

In a radiation incident, you may encounter three general classes of patients who may be classified under one or more of the conditions listed below: *Please note that a patient may experience a **combination** of any of these conditions.*

1. Patient was exposed to radiation from an external source

A patient exposed to radiation alone will not pose a contamination problem. The degree of radiation-induced injury depends on the radiation dose the patient received. Following external exposure, a patient is not radioactive or contaminated and can be handled without fear or concern of spreading contamination to you or the environment.



Treat a patient exposed to external radiation no differently than a person who may have received radiation therapy. If the level of exposure was low, the patient may be viewed as someone who received diagnostic X-rays. If the level of exposure is very high, subsequent treatment at a specialized hospital may be necessary. It is important to remember, however, that no one has ever received a medically significant exposure to radiation during a transportation incident involving radioactive material.

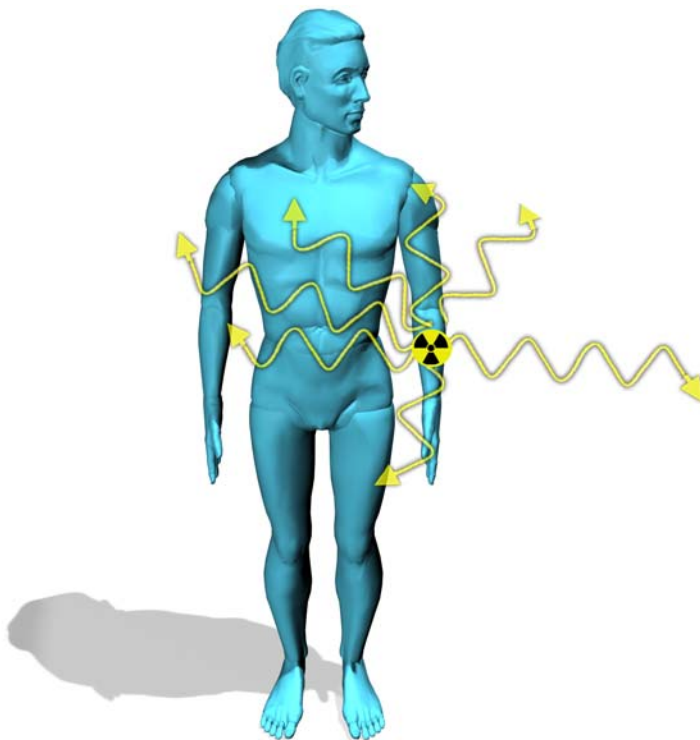
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2. Externally contaminated patient

Coming into contact with radioactive material (gas, liquid, or solid) that has been released into the environment can contaminate a patient. Externally contaminated patients may have radioactive material on portions of their bodies or clothing. This contamination, if spread, presents a potential hazard to a hospital environment and to other people. If you suspect external contamination and the patient is seriously injured, give lifesaving assistance immediately. Contaminated patients should be handled with protocols (i.e., Universal Precautions) similar to those used for bloodborne pathogens.



Wear protective clothing (coveralls, gloves, turnout gear, etc.) while handling an externally contaminated patient. This will limit the spread the contamination. You should wrap the patient in a blanket or sheet during movement, and save all related clothing and bedding in plastic bags. Identify the bags clearly as “RADIOACTIVE - DO NOT DISCARD.” The outer clothing of response personnel attending to the patient also needs to be saved and surveyed by qualified personnel for contamination. Contaminated items will have to be handled and disposed of in accordance with state and federal regulations.

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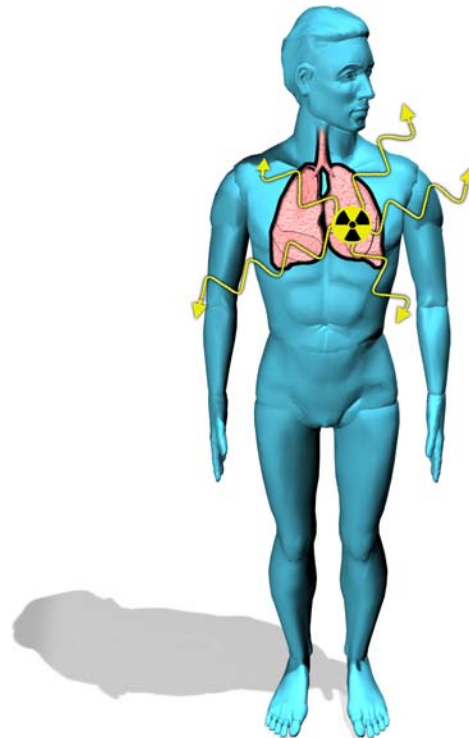
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A patient could have contamination in, or near, a wound. In this case, your primary objective must be to treat the wound and prevent any further spread of radioactive contamination into it. An open cut or wound can allow contamination to enter the body, causing internal contamination.

3. Internally contaminated patient

Internally contaminated patients present minimal risk to response personnel. A patient can become internally contaminated if radioactive material is inhaled, ingested, or introduced to the body through a cut or wound.

The internally contaminated patient may also be externally contaminated and, if so, must be treated using the procedures described earlier. The internally contaminated patient will require specialized treatment at a hospital to prevent further uptake of the contaminant and/or to promote its removal from the body.



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PATIENT HANDLING/GROSS DECONTAMINATION

If you suspect contamination, removing all of a patient's outer clothing—a process called gross decontamination (decon)—can dramatically reduce the amount of contaminants on the body. The best technique for gross decontamination is to cut the patient's outer clothing up the middle and carefully lay the cut clothing open, away from the patient. This process minimizes the spread of contamination. A gross decon should only be considered if radioactive material packages appear breached and you suspect that contamination has been released.

If you suspect contamination and have performed a gross decon, leave the patient's clothing inside the hot zone². This clothing will need to be bagged and identified as radioactive. Minimizing the amount/quantity of contaminated or radioactive material (removed clothing, packages, etc.) in the treatment area will help keep radiation dose rates low. If possible, wipe any exposed surfaces—especially those around the patient's mouth, if you are applying an oxygen mask or respirator. Additional decontamination should only be attempted by trained personnel and only if time permits.

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² Hot zone refers to the area surrounding the incident site where contamination is suspected. This area may also be referred to as the exclusion zone or control zone.



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The following step-by-step procedure is provided as an example, and can be used as a guideline, for performing gross decon and proper packaging of a potentially contaminated patient.

1. Utilize the ERG to conduct a scene size-up. Establish contamination control zones and, without entering the hot zone, determine essential treatment equipment needed.

Note: If Incident Command has already been established, EMS care providers should report to the Incident Commander for a scene size-up. If response actions are being initiated by EMS care providers and the scene size-up has been completed, care providers should also consider reducing the possibility of contamination spread by only carrying essential medical equipment inside the hot zone.

2. Prior to entry into the hot zone, prepare the backboard or other device that will be used to remove the patient from the hot zone as follows:

- A. Spread a protective barrier (blanket, sheet, etc.).



- B. Spread a second protective barrier (blanket, sheet, etc.).



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- C. Place the backboard or other device in the center of the protective barrier.



- D. Roll edges of the protective barrier until only the remaining unrolled portion can be placed on top of the backboard or other extrication device.



- E. Place essential medical response equipment on top of the backboard or other device. Avoid taking advanced life support equipment into the hot zone.



3. Don appropriate protective clothing. Firefighting gear or Body Substance Isolation Clothing (BSIC) is recommended, including 2 pair of latex gloves and respiratory protection if available (such as Self-Contained Breathing Apparatus, Air Purifying Respirator, or N95 Particulate Mask).



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4. Enter the hot zone and place the backboard or other device adjacent to the patient and unroll the protective barriers.

Note: The double blanket method will help reduce the possibility of spreading contamination. The outer blanket will reduce/eliminate responder contact with contaminated surfaces and protect the backboard or other device from contamination. EMS equipment should be placed on the blanket to minimize the potential for equipment to become contaminated. The inner blanket, when wrapped around the patient, will encapsulate any remaining radioactive contamination to the patient.

Life threatening injuries such as exsanguinating hemorrhage and airway control should be corrected immediately. Advanced life support should not be attempted in the hot zone. The patient should be promptly packaged and transferred to the clean area for further care.

5. Evaluate the need for reducing contamination on the patient.

Note: Contamination reduction should be considered if the incident/accident scene contains open or breached radioactive material packages.

6. Reduce contamination by very carefully cutting the patients clothing away from the body.

Note: Cut clothing on the center of all body extremities and the trunk. Carefully lay cut clothing open, exposing the patient's body.



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7. Responders should carefully remove their outer pair of latex gloves.



8. Treat non-life-threatening injuries as necessary. If contamination is suspected in or near a wound/injury, the primary option is to treat the wound/injury and prevent additional spread of contamination.

Note: If cleaning of injured area is to be conducted, wipe away from all open wounds or the airway. Only use the wipe(s) one time and handle all waste as potentially contaminated material. Place the wipe(s) in a controlled disposal container so that they can be monitored for radiological contamination by the local radiation authority.

9. Load the patient on to the backboard or other device using standard medical protocols and wrap the inner protective barrier around the patient.



Note: All clothing removed from patient, gloves, and outer blanket should remain inside the hot zone. These items should be handled as radioactive waste. The local radiation authority will coordinate the packaging and removal of waste.

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10. Emergency medical care providers should hand carry the patient to the boundary of the hot zone.



11. A second team of care providers should have an appropriate transportation device waiting at the boundary of the hot zone. This device should also be covered with a protective barrier.



12. At the boundary of the hot zone, responders should pass the patient across the control line to waiting responders.



Note: Care providers within the hot zone should remain there until surveyed by the local radiation authority or other qualified person and determined to be free of contamination. If additional responders are not available, the treating responders should remove protective clothing at the hot zone boundary and provide transportation of the patient to the appropriate medical facility. Based on local procedures, the patient may require additional transfers at each of the contamination control zone lines.

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13. After transferring the patient to the clean area, emergency medical care providers should cover the patient with the protective barrier that was placed over the transport device.



14. Load the patient into the ambulance for transport to the hospital.



Note: To reduce/prevent possible contamination of the ambulance, consider the following additional precautions: open the protective barrier covering the patient only to administer necessary patient treatment (e.g., introduction of IV fluids, etc.); place floor covering (paper or plastic, etc.) on ambulance floor; avoid opening ambulance cabinets—work out of portable response kits as much as possible; and, consider all items used in the treatment of the patient potentially contaminated. Consider turning off the ambulance’s patient compartment ventilation system to avoid spreading airborne contamination outside the ambulance.

Patient Transfer

15. After the patient(s) has been loaded into the ambulance, the emergency medical care provider(s) should wear appropriate protective clothing.
16. Emergency medical care providers transporting the patient should verify that the receiving hospital has the capability to treat and care for potentially radiologically contaminated patient(s).

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17. Upon confirmation, emergency medical care providers should notify the receiving hospital of patient status, radiological contamination concerns, estimated time of arrival, and the need for the monitoring of themselves and the ambulance. Ask whether the hospital has any special instructions or procedures for receiving contaminated patients. The hospital, for example, may have a special entrance for radiologically contaminated patients.
18. Emergency medical care providers, upon arrival at the hospital, should follow the hospital's radiological control protocol. At the maximum, emergency medical care providers should remove the patient from the ambulance and then establish a contamination control zone in and around the ambulance. The ambulance should not be returned to regular service until the crew, vehicle, and equipment have been surveyed for radiological contamination.
19. Do not eat, drink, smoke, or chew until you have been surveyed and released by the Radiation Safety Officer at the hospital or other qualified radiation authority.

Check Your Understanding



1. At the scene of a transportation incident, it is important to approach the site with caution looking for all _____.
2. Some radioactive materials are _____ and may cause chemical burns.
3. Treatment protocols at a radioactive material transportation incident should be based on which of the following:
 - a) Treat for radiation exposure first
 - b) Treat for contamination first
 - c) Treat injuries and medical priorities first
 - d) Withhold treatment until the patient is transported
4. In a radiation incident, you may encounter three general classes of patients. These, either singularly or in combination, are:
 - 1) _____
 - 2) _____
 - 3) _____
5. A patient who has been exposed to _____ alone presents no hazard to emergency care providers.
6. Performing a _____ can dramatically reduce the amount of contaminants on a patient.
7. Responders transporting possibly contaminated patients should not _____, _____, _____, or _____ until they have been surveyed for radiological contamination and released as "clean."

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ANSWERS

1. hazards
2. corrosive
3. c
4. See pgs. 4-6
5. radiation
6. gross decon
7. eat
drink
smoke
chew